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Comparison of sea ice concentration derived from small-scale ice motion and interpretation of spaceborne passive microwave radiometry

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Openings in the Arctic Ocean sea ice cover can be derived from the fine-scale sea ice motion fields derived from time-sequential synthetic aperture radar (SAR) imagery. These fine-scale ice motion fields are available as routine products from the RADARSAT Geophysical Processor System (RGPS). Ice concentration over an enclosed area can be directly calculated as the ratio of the difference between that area and the integrated openings within, and the total enclosed area. We compare the ice concentration obtained in this manner with that derived from spaceborne passive microwave observations. Preliminary results indicate that, due to the footprint of the Special Sensor Microwave/Imager (SSM/I), current retrieval algorithms are relatively insensitive to small areas of open water. In the winter central sea ice pack, where most of the openings are localized along long linear lead patterns, lead areas are substantially smaller than the sensor footprint thus resulting in over-estimates of the ice concentration. In certain areas, however, anomalous and persistent areas of lower ice concentrations can be found in the SSM/I retrievals that would tend to have an opposite effect on the concentration estimate. These seem to be due to weather or surface effects but the causes are not well-understood. Here, we highlight the results from our preliminary comparison and emphasize the availability and importance of the RGPS dataset for validation of the retrieval algorithms for lower-resolution sensors.

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